Shallow Water Habitat Development and Management

Conservation Practice WV Job Sheet Code 646

Definition

The intentional inundation of lands to provide habitat for fish and/or wildlife.

Purpose

To provide habitat for wildlife such as shorebirds, waterfowl, wading birds, mammals, fish, reptiles, amphibians and other species that require shallow water for at least a part of their life cycle.

Conditions Where Practice Applies

This practice applies on lands where water can be impounded or regulated by diking, excavating, ditching, and/or flooding; and on floodplain areas connected to streams or rivers that provide refuge habitats for native fish during high flow periods.

Considerations for Establishment

Individuals utilizing this practice should work closely with trained biologists from NRCS, the WV Division of Natural Resources and/or the US Fish and Wildlife Service.

A soils investigation should always be performed to determine conditions such as seepage, suitability for construction, adequacy of water supply and the ability to support the desired plant community.

To benefit the most species of wildlife at least 75% of the total site should consist of water 18 inches or less in depth during periods of inundation. For some habitats there could be some exceptions. Consult the local NRCS field office or WV Division of Natural Resources Fisheries biologist to determine if this applies.

Shallow water impoundments require an adequate water supply for filling and reflooding the site. It is recommended that a “water budget” or a hydrology investigation be performed on-site to determine if sufficient water is available to adequately flood the site during required times. Contact the local NRCS field office for more information.

A. Water Control Structures

Most naturally occurring shallow water areas do not have standing water throughout the year. Water levels will rise and fall seasonally in response to varying natural conditions. Therefore, a method for dewatering the site should be provided. This also provides a method to perform maintenance and allows the recovery and establishment of various plant communities.

Water control structures should be designed on an individual basis to meet the site conditions and functional requirements. These structures should be designed to adequately mimic natural conditions or constructed to allow flooding and dewatering at desired times.

Water control structures planned to provide amphibian breeding habitat should be designed to prevent fish access to the area.

Where fish have access to the impoundment, water control structures must be designed to prevent them from being trapped as water recedes.

“Stoplog” and flashboard risers allowing 2-inch changes in water levels work the best. “Screw” type gates will also function but may not allow fine adjustments of water levels. Any water control structure installed must be able to handle storm events as well.

These allow managers to have greater control over water levels and the speed at which it rises and falls. However, any type of structure that allows mangers to drawdown water levels in incremental portions is adequate.

All structures must be designed and installed to meet NRCS standards. Water control structures and drainage modifications must comply with all local, state and federal regulations. Contact the

local NRCS field office to obtain additional design information.

If natural drainage systems already exist on the site, they can be utilized, removed or modified as needed to saturate or flood the area(s).

Where active habitat management is planned (such as disking or water level management) a point of access should be planned and developed to facilitate any management activities and equipment.

B. Wildlife Habitat

Many types of waterfowl and mammals utilize shallow water areas including, many species of ducks, wading birds, and amphibians and reptiles. There are many factors that affect the use of shallow water areas by wildlife such as:

- water depth
- duration of water (timing)
- soil-water interface (shoreline)
- structure and types of vegetation (height & density)
- food availability
- season

By creating or managing a diversity of habitats it is possible to provide resources for multiple wetland organisms throughout their annual cycle.

1. Amphibians

The timing and duration of flooding are important factors that dictate which amphibians will use a particular area.

Amphibian species are extremely variable in their habitat requirements. Most breeding occurs from March through August, with eggs hatching anywhere from 2 to 20 days later. Complete metamorphosis may take an additional 2 weeks to 3 months.

Some species may need as much as 2 years to develop, with a few species overwintering as tadpoles, requiring permanent water.

Flooding of shallow water impoundments should be planned to last throughout the local breeding period of at least one local amphibian species. Contact the local NRCS field office or the WV Division of Natural Resources to obtain breeding cycles of various amphibians.

Surrounding upland habitat is an important component for life cycles of amphibians and may require a buffer of 100 to 800 feet in some species. Upland habitat shall be of sufficient quality and quantity to support the complete life-cycle requirements of at least one endemic amphibian species.

Supplementing flooded areas with logs and large rocks that will become partially submerged when flooded may provide basking sites for reptiles and amphibians.

2. Waterfowl

The vast majority of waterfowl benefit from water depths of 18 inches or less. Deeper water may not provide the diverse amounts of food plants and invertebrates that more shallow areas often provide. Shallow water habitats are quicker to warm in early spring and produce food sooner for early spring migrants.

Managers should strive to create varying depths within an area to provide a diversity of habitats for as many species of waterfowl as possible. Figure 1 illustrates different foraging depths that various guilds of waterfowl utilize most frequently.

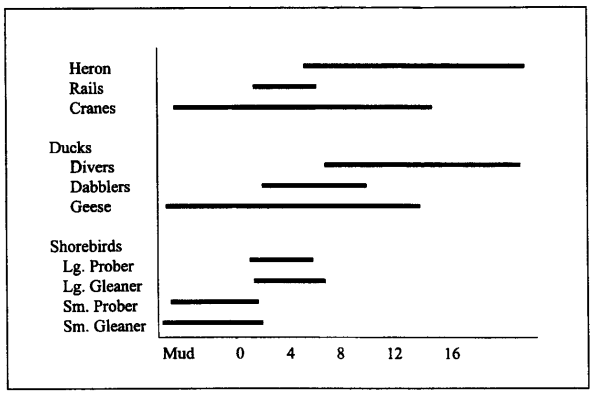

Figure 1. Shows the foraging depths for different waterbird guilds. (After Fredrickson 1991).

Shorebirds rely upon a mosaic of wetlands and associated uplands to provide all of their seasonal requirements. They require suitable wetlands where they can periodically stop to rest and feed. These staging areas should provide shallow water and mudflat habitats with sparse vegetation, an abundance of food and undisturbed resting sites.

Peak migration periods occur from March to April and again in July through September; however, when possible coordinate with local NRCS field office or the WV Division of Natural Resources to obtain specific migration times for each year rather than rely on estimated dates.

Areas planned to provide shorebird habitat should have exposed wet and drying mudflats and areas with shallow water during seasonal periods of shorebird use (March – October). The foraging depths for most shorebirds range from *1 to 4 inches*.

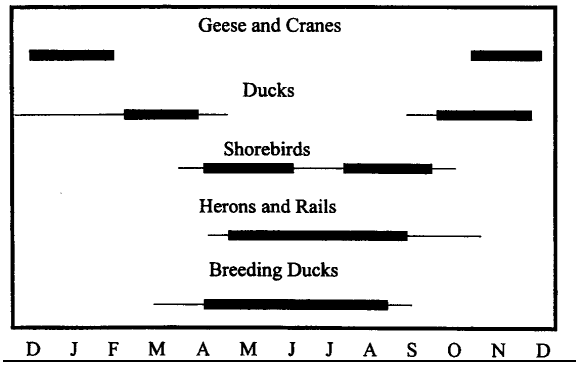

Figure 2. Seasonal use of shallow impoundments and ephemeral wetlands (Fredrickson 1991).

Waterfowl utilize shallow impoundments at varying times of the year (Figure 2). Therefore, food and cover should be available throughout the season but especially during peak migration periods when energy demands on waterfowl are highest. Although West Virginia is not within a major migratory flyway, this type of habitat benefits those avian species that appear from either more eastern or western routes.

C. Vegetation

Vegetation is important to waterfowl for producing seeds, tubers, and browse, providing nest sites and serving as substrates for animal foods (prey). Emergent shallow wetlands require good interspersion of cover and water to attract and hold waterfowl. Likewise, a diversity of wetland vegetation is much more desirable than a monoculture or homogenous community.

Plants that produce a large amount of seed for food are desirable. In wetlands that are used for breeding plants that provide cover for nesting, broods and molting birds are desired. In addition to seeds, tubers and cover these communities provide a greater source of invertebrate (insect) protein.

Plants such as barnyardgrass, sedges, duck potato, smartweeds, rushes and wild millets are desirable plants. Cockleburs, asters and dock are also good not only for cover and browse but for insect production. Many other plants including domestic grains provide supplemental food as well. Establish the maximum amount of species possible on each site.

Germination of individual plants is dependent upon a number of factors including climate, seed bank, temperature and moisture.

Species	Habitat Guild	Vegetative Height	Vegetative Cover
Herons	Open Water	Short	Sparse to None
Bitterns	Open Water	Tall	Dense
Rails	Open Water Mud	Tall	Dense
Cranes	Open Water Mud Upland	Short	Moderate to Sparse
Diving Ducks	Open Water	Short	Sparse
Dabbling Ducks	Open Water Mud	Medium	Moderate to Dense
Geese	Open Water Mud Upland	Short	Moderate to Sparse
Shorebirds	Open Water Mud	None -Short	Sparse to None

Table 1. Various waterbirds and the vegetation characteristics they prefer.

Areas containing food plants should be flooded during seasonal periods of waterfowl use. Refer to Figure 2.

For the most part in West Virginia, there is sufficient seed within the soil (seedbank) that natural succession should be utilized to establish herbaceous vegetation in the pool area. These communities may be manipulated by mowing, disking or other methods to encourage early successional plant species.

Areas planned to provide waterfowl feeding and resting habitat must be designed to facilitate gradual flooding of areas containing food plants to an average depth of 6 to 10 inches.

D. Grain and Seed Crops

Grain and seed crops may be planted to provide supplemental food sources. Wheat, millets and other grains are excellent food sources for a variety of ducks and other waterfowl. Time the planting of this crop to have the food source available at the desired time.

Annual crops for wildlife may be planted in, or adjacent to, the pool area. Plantings may be established by means of conventional farming equipment or by broadcasting seed on exposed soil after a drawdown. Reflooding should occur after the crop has become established.

Utilize those species which are tolerant to site conditions and are beneficial to the target wildlife specie(s). It may be necessary to refer to Critical Area Seeding (342), Wetland Wildlife Habitat Management (644) and/or the NRCS local field office for specific recommendations and rates.

E. Scheduling Drawdowns

As a general rule, early and midseason drawdowns result in the best quantity of natural seed producing plants and the most diverse plant communities. This is because newly established plants must have time to develop adequate root systems before the onset of dry summer weather, thus minimizing plant mortality.

Some plant species respond better to early drawdown, while others respond to midseason or even late drawdowns. A trial and error process may be required initially to determine the best scenario for an individual site based on species composition and the desired outcome. However, late drawdowns should be avoided when possible as they tend to result in lower plant diversity and do not provide the necessary time for plant development.

The speed at which drawdowns occur will also influence the plant community and subsequent use by wildlife. Fast drawdowns (1 - 3 days) are usually not recommended in West Virginia as these often result in poor germination and plant establishment. Fast drawdowns may be necessary in times of unusual weather scenarios such as drought or very wet years.

Slow drawdowns (2 – 4 or more weeks) are usually more desirable for plant establishment and wildlife use. These tend to provide more favorable conditions for plant germination and wildlife use. Refer to Figure 3 (page 7) for suggested flooding regimes.

Other Considerations

Many factors should be considered when applying this practice. Most importantly, permits may be required prior to implementing this practice from federal, state and local agencies. This especially applies when the placement of fill or excavation is required in an existing wetland. Contact the local NRCS field office for information regarding any necessary permits.

For multiple management units, an independent water supply and discharge from each unit should exist. Water supply should enter at the highest elevation and exit at the lowest elevation. The floor of the water control structure should be set at the correct elevation to completely drain the site. However, a depressional area 20 feet in diameter and of sufficient depth to prevent completely freezing in winter that is not subject to drainage could be left for amphibian habitat.

The optimum size of a management unit is between 5 and 100 acres. Smaller areas are acceptable but may not be able to produce all the necessary lifecycle requirements in sufficient quantities. Ideally there should be 5 - 7 management units within a 10 mile radius.

Consider the surrounding habitat and the connections to the management units. Provide connectivity, diversity and interspersion where possible.

Operation and Maintenance

Waterfowl and shorebird feeding and resting areas that can be hydrologically controlled or have natural dry periods should be disturbed at suitable regular intervals to set back succession and control the growth of undesirable plants. If water levels remain at a constant level the plant community may not develop the diversity desired.

Vegetation structure can be modified with machinery to provide good interspersion. Disturbance may consist of disking and/or mowing or other suitable practice (Table 2). Prescribed flash grazing could be utilized in accordance with a grazing management plan with wildlife as the primary resource concern. Refer to the WV conservation practice Prescribed Grazing (528) for more information.

It is important to remember the following regarding disturbances to vegetation:

- The response following mechanical treatments is dependent mostly upon the timing of the treatment.
- Mechanical treatments performed late in the growing season often require irrigation for germination of seed producing annuals and are not recommended.
- Impacts of mechanical treatments primarily influence the plant community the following year.

Manipulation and maintenance should occur when the pool area is sufficiently dry to support equipment and when wildlife use of the area is lower.

Implement	Depth	Effects
Chisel Plow	5-9 inches	Breaks Claypan Releases Nutrients Alters Seedbank
Offset Disk		Retains Soil Moisture Reduces Competition Alters Seedbank
Shallow	1-4 inches	
Deep	5-7 inches	
Finishing Disk	1-5 inches	Reduces Competition Alters Seedbank
Cultipacker		Breaks Soil Enhances Seedbed
Bush Hog		Reduces Woody Invasion
Mower		Opens Canopy Enhances Community
***Flash Grazing**		Breaks Soil Enhances Seedbed Alters Seedbank

Table 2. Various disturbance tools, their use and effect on vegetative communities. * Flash grazing should be utilized with caution and could introduce unwanted plants.

Vegetative manipulation should occur no more frequently than once every 2-3 years; or when the site requires maintenance due to encroachment from invasive, woody or other undesirable species.

Sometimes a disturbance/flooding/drawdown regime provides an opportunity for undesirable species to become established. Careful consideration of the surrounding plant communities may prevent this from happening. Noxious and aggressive species (purple loosestrife, phragmites, reed canarygrass, etc.) must be controlled by chemical, biological or mechanical means where practical and necessary. Any use of fertilizers, mechanical treatments, pesticides, chemicals or other treatment must not compromise the habitat. Many pesticides are lethal to amphibians and should be avoided when possible during establishment and maintenance of habitat. The use of any chemicals must be done in accordance with product labels, manufacturers' recommendations and all federal, state and local regulations.

References

Fredrickson, L.H., 1991. *Strategies for Water Level Manipulations in Moist-Soil Systems*, 13.4.6, Gaylord Memorial Laboratory, School of Natural Resources, University of Missouri-Columbia., Puxico, MO.

Fredrickson, L.H., Reid, F.A. 1988. *Waterfowl Use of Wetland Complexes*, 13.2.1, Gaylord Memorial Laboratory, School of Natural Resources, University of Missouri-Columbia., Puxico, MO.

Fredrickson, L.H., Reid, F.A. 1988. *Preliminary Considerations for Manipulating Vegetation*, 13.2.1, Gaylord Memorial Laboratory, School of Natural Resources, University of Missouri-Columbia., Puxico, MO.

Hands, H.M., M.R. Ryan, J.W. Smith. 1991. *Migrant Shorebird Use of Marsh, Moist-Soil, nd Flooded Agricultural Habitats*. Wildlife Society Bulletin 19 (4): 457-464

Green, N.B., and Pauley, T.K., *Amphibians and Reptiles in West Virginia*, 1987. University of Pittsburgh Press. Pittsburgh, PA

NRCS Natural Resources Conservation Service

Specifications

Site-specific requirements are listed on the following pages of this job sheet. Specifications are prepared in accordance with the WV NRCS Field Office Technical Guide. Information in this job sheet is considered part of the conservation plan.

Shallow Water Development and Management – WV Job Sheet

Client:	**Farm #:**
Field(s):	**Tract #:**
Designed By:	**Date:**
Project Goals & Objectives:	
Targeted Wildlife Specie(s) or Habitat Guild(s):	

Purpose (check all that apply)	
☐ To provide wildlife habitat for fish	☐ To provide wildlife habitat for wetland dependent mammals
☐ To provide wildlife habitat for waterfowl, shorebirds and/or wading birds	☐ To provide wildlife habitat for other species:
☐ To provide wildlife habitat for reptiles and/or amphibians	(Specify):_____

Supplemental/Component Information (Check all that apply)

☐ Other engineering design(s) and/or specifications necessary for restoration – **Refer to the specific engineering drawings, specifications, designs and criteria for the following:**

☐ Dike (356)
☐ Use Exclusion (472)
☐ Pond (378)
☐ Diversion (362)
☐ Wetland Restoration (657) – Channel Blocks
☐ Wetland Restoration (657) – Subsurface Drainage Removal
☐ Grassed Waterway (412)
☐ Structure for Water Control (587)
☐ Pumping Plant for Water Control (533)

☐ Other:_____

☐ Section 401 and 404 of the Clean Water Act or other permits will be required prior to practice establishment **(Refer to Nationwide Permits, Individual Permits or other regulatory requirements)**	☐ **Enrolled as part of the Wetland Reserve Program** (Refer to specific WRP program requirements and guidelines)

☐ Easement planned on the site - **List responsible entity and duration of easement**:

_____

Soils Information - Refer to the local soil survey and soils description or a qualified soil scientist.

Field	Dominant Soil Type(s) [1]	Acres	Drainage Classification [2]	Hydric Soil [3]	Slope [4] (%)	Water Table Depth(s) [5] (in)	Soil Limitations [6]

[1] List the predominant soil types of the project area as shown in the local soil survey.

[2] According to the local soil survey, identify if the dominant soil is classified as Excessively Drained (**ED**), Somewhat Excessively Drained (**SED**), Well Drained (**WD**), Moderately Well Drained (**MWD**), Somewhat Poorly Drained (**SPD**), Poorly Drained (**PD**) or Very Poorly Drained (**VPD**).

[3] Indicate whether this soil is classified as hydric (on the local hydric soils list). Indicate whether it is listed as: Hydric Soil (**HS**), Non-Hydric Soil with Hydric Inclusions (**NHSI**), and Non-Hydric (**NH**). **NOTE**: At a minimum, soils should have a moderately slow permeability or a seasonal high water table and have the ability to maintain the planned water levels throughout specified period(s).

[4] Identify the approximate average slope of the project area (i.e. from the inlet to the low point of the site).

[5] If known, identify the existing average water table depth before the project (e.g. 0-6 inches). Refer to the soil description in the local soil survey.

[6] List any obvious or notable limitations to construction, management or operation and maintenance that may be encountered due to soil characteristics (e.g. sand lenses, claypans, rock outcrops, etc.). Use the additional notes section of this document if necessary.

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Hydrology Information and Drawdown Schedule

Field	Hydrology Source [1]	Primary Wildlife Period [2]	Maximum Average Depth of Site [3] (in)	Period(s) of Flooding and Drawdown [4] (dates)		Average Depth During Specified Period [5] (in)	Drawdown Type [6]
				From	To		

[1] Identify the principle source of hydrology that will be utilized. List as: **precipitation** (overland flow), **diversion**, **pumped**, **groundwater**, **flooding**, or **other** (specify in the "Additional Specifications and Notes" section). Combinations may also be utilized.

[2] If providing migratory habitat, identify the target migratory period of use for the intended wildlife. List as: **Fall**, **Spring**, **Fall and Spring** or **N/A**.

[3] Identify the maximum average depth of the site at normal pool.

[4] List the period at which the average water level depth should be on the site. Refer to Figure 2 of this document. (e.g. From 12/06 to 2/07)

[5] Identify what the average water depth during the specified period of flooding or drawdown should be at the specified date.

[6] List the duration of drawdown as: **Fast** (2 - 3 day period) or **Slow** (2 - 4+ week).

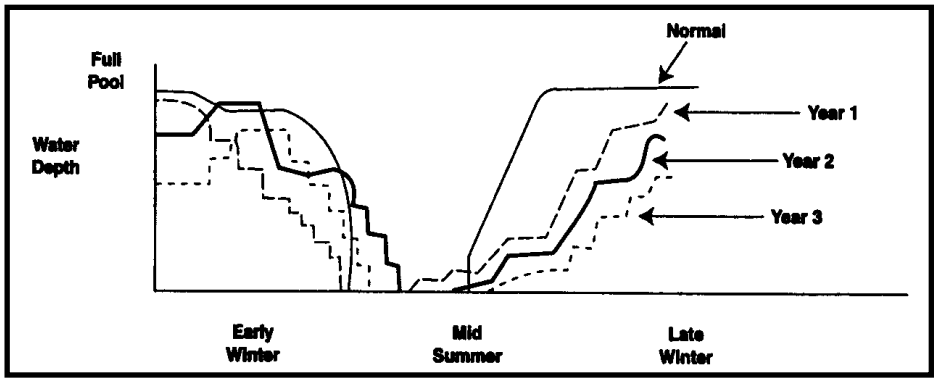

Figure 3. Suggested flooding regimes for seasonally flooded wetlands of the Midwest. After Fredrickson 1988.

The figure at left indicates a suggested flooding regime over a three year period.

Normal – Typical midsummer drawdown to establish moist soil vegetation. Fall and winter flooding for waterfowl.

Year 1 – Gradual drawdown to optimize use by late spring migrants. Gradual reflooding for rails and waders.

Year 2 - Gradual drawdown lasting into midsummer to optimize use by late spring, migrant waterfowl, shorebirds and waders.

Year 3 – Increasing water depths in spring to make food resources available, gradual drawdown by late spring

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Vegetative Community – If planting, identify the species, quantity, planting dates, spacing and planting depths. Use additional sheets if necessary.											
Field #	Species Planned for Establishment or Target Community [1]	Establishment Method [2]	Disturbance Method [3]	Disturbance Date	Disking Depth Range (in)	PLANTING ONLY [1] (Use only if planting is identified as the establishment method)					
						Planting Method	Stock Type [4]	Planting Date	Average Spacing (ft)	Rate or Quantity (per acre)	Planting Depths (in)
	1										
	2										
	3										
	4										
	5										
	1										
	2										
	3										
	4										
	5										
	1										
	2										
	3										
	4										
	5										

[1] List species or describe the community planned for the area and the method of establishment. List major target species, specific type of wetland community or supplemental food crops to flood. If planting, list all applicable information including method, stock type, site preparation, spacing, rates and dates of planting under the appropriate section. Refer to Critical Area Seeding (314) or Pasture and Hayland Planting (512) for establishment criteria. *No variety of tall fescue, purple loosestrife or reed canarygrass shall be used in conjunction with this practice.*

[2] Identify the method of establishment as; Hand Planting (**HP**), Mechanical Planting (**MP**) or Natural Succession (**NS**). For natural succession, an existing seed source must be present within reasonable proximity.

[3] List the method of disturbance as **mowing**, **disking, flash grazing** or **other** (specify in the "Additional Notes" section of this document). Also, list the target date(s) for the disturbance activity. If disking identify the depth range to disk. If necessary refer to the WV conservation practice standard Early Successional Habitat Development/Management (647).

[4] If planting, identify the stock type as; **Tuber, Seed, Rhizome, Transplant, Donor Soil, Sod Mats, Cuttings, Seedlings** or **Other** acceptable source (If other, specify in the "Additional Specifications and Notes" section).

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Shallow Water Development and Management – WV Job Sheet

If needed, an aerial view, map or a sketch of the practice can be shown below. Other relevant information, complementary practices and measures, and additional specifications may be included.

Refer to the conservation plan map for specific locations of conservation practices.

Additional Specifications and Notes: (i.e. required permits, herbicide application, operation and maintenance specifics, etc.)

Operation and Maintenance will be performed in accordance with the section of this document entitled "Operation and Maintenance" and the scheduled disturbance/flooding/drawdown regime. **Additional Notes:**

Questions regarding the establishment, operation or maintenance of this practice should be directed to:

_____**at**_____

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